latter constitute the powdery "seed-like structures" mentioned so often by Davis and other workers on Oenothera.

Oenothera, Gaura, Clarkia, Eucharidium and Circaea possess definite hypostases, while Ludwigia, Jussiaea, Godetia and the majority of species of Epilobium and Fuchsia are characterized by its absence. The first group is notorious for the presence of tiny, malformed seeds incapable of germination, while such are practically unknown in the latter group. For Zauschneria, Lopezia and Boisduvalia, there is no data regarding the presence or absence of hypostases; all three are said to have wholly fertile seeds, hence one may conclude that these lack a hypostase.

In conclusion the author holds that germination tests of seeds of species of the Onagraceae possessing a hypostase in their ovules are of no significance or value whatever, for reasons which are so obvious that they need not be elaborated.

Department of Botany, Stanford University
July 24, 1927

THE BOTANICAL EXPLORERS OF CALIFORNIA.—I.

Willis Linn Jepson

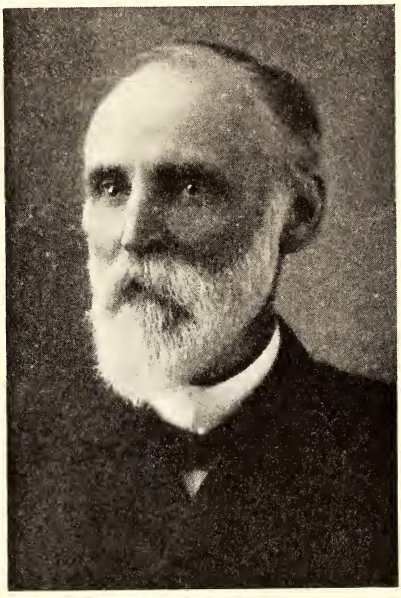
Definite botanical exploration of California has been proceeding for something like one hundred and forty years. More or less of the field work of the earlier explorers has been made a matter of printed record. The interval of the last fifty years covers a period represented by much devoted field work on the part of certain men who have passed away without mention or with only scant notice. Without exception these collectors contributed results of their field studies and material from their collections unstintedly and widely, more especially to those engaged on major botanical tasks. It has appeared, therefore, unfitting that the men who had in this way done much to promote the progress of systematic botany in California and North America should pass on without a word of memorial. It is not difficult for anyone with some gift of expression to write a felicitous appreciation of personality and character, and this is well worth doing. However, it has seemed to the writer that a real memorial should rather bring together the essential facts in regard to the life of the explorer and the important information regarding his field work in a permanently accessible form. Research men in systematic botany raise almost endless questions in regard to the field of operation of a botanical collector and his plant materials. A memorial, therefore, which is useful for reference seems the kind worth making. A sound view this, we think, but how difficult to realize! Facts, as is well known, are exceedingly expensive to assemble, and in a given case their assembling may not prove feasible. Information which might readily be had in a collector's lifetime, is lost with his death. When an explorer is no longer living it is often disconcertingly difficult to make a record of his collecting expedi-

tions, which is of geographic significance, and the years when the work was done. In these tributes which follow, this main purpose of a useful memorial has always, nevertheless, been kept steadily in mind though so imperfectly attained.

Volney Rattan

In the spring of 1877 a girl in the botany class in the Girls' High School in San Francisco held up her hand one afternoon and asked a question. The instructor, in answer, went to the blackboard and quickly made a drawing. Never before had there been a teacher in that school who could make blackboard drawings with so skillful and sure a hand; never before had there been a teacher who had so much interest in botany. These young girls of the school grew in time to be women—and remembered. When, thirty years later, at a reunion of the alumnae of the San Francisco Girls' High School the name of Volney Rattan was mentioned, it was greeted with prolonged applause.

Volney Rattan was born near Madison, Wisconsin, on May 23, 1840. He was educated in the country schools of Wisconsin and Iowa, and had three years, 1857 to 1860, in the University of Wisconsin. After leaving the University he came by the Overland Trail to California in the spring of 1861 and settled in Placerville, better known to the unhypocritical argonauts as Hangtown. In those early days the Sierra foothill towns were centers of importance where Horace Greeley spoke and Edwin Booth played Hamlet. So in Placerville, Rattan found work to his hand in the county's public schools. One day there came into Rattan's office a young man who desired to teach. Rattan on the spot examined him on English and grammar, then he sent him to one of the members of the School Board, a business man, to be examined on arithmetic, after which Rattan took down a plain sheet of paper from a pigeon hole and certified that C. W. Childs was qualified to teach in the public schools in California. We must remember that in that early day in California education itself was still respected and valued. There was a general and deep-rooted prejudice in the



Volney Rattan

community that it was a highly desirable thing to have an education if you could get it. The schools, as a consequence, attracted really able men. Growing youth were held to be an important care; and files, pedagogical methods, correctly printed forms, palatial buildings, pupil activities, commercialized athletics and honor systems were quite unknown. The generation was too busy, all of it that could, in getting an education, to care about non-essentials or to think of making them the main thing. One of the great leaders in promoting education turned out to be this C. W. Childs, whom Volney Rattan started safely and securely on his way to become at a later time, the President of the California State Normal School at San Jose.

In this same connection Rattan himself is worthy of honorable mention. He did important work as a teacher of science in the Santa Cruz High School from 1873 to 1876 and in the Girls' High School, San Francisco, from 1876 to 1889. In 1889, President Childs, knowing well the excellent record of Volney Rattan, and also remembering Hangtown, called him to teach botany in the State Normal School. Here Rattan remained until 1906, the date of his permanent retirement.

Volney Rattan had gifts as a teacher. One of his old-time students at the Girls' High School in San Francisco, tells me that he readily inspired lasting interest in the subject of botany. He was in particular a facile blackboard artist and could illustrate, quickly and effectively, details of habit or a principle of plant structure. After his retirement from the Normal School he lived in Berkeley, where he died March 4, 1915. He was a courteous fine-grained gentleman; although so unobtrusive and modest in his ways, neverthless a deal of silent homage was his. It can well be said that in those early days he did more for botanical teaching in the public schools and for wide diffusion of interest in the native flora amongst the people of California than any other man. His "Popular California Flora" was well suited to its purpose and it has given to thousands of Californians a pleasure in the fields and forests which they associate with their earliest experience of wild life. In some ways a matter of fact and practical book, yet it had an engaging interest and even charm, due mainly to the many excellent old-time wood engravings made after Volney Rattan's own drawings.

The first edition of the "Popular California Flora" appeared in 1879 and was published by the celebrated San Francisco firm of Bancroft. It consisted of 106 pages and included only the common exogens. In the second edition (1880, 138 pages) the common endogens were added. Editions 3 and 4 followed in 1882, edition 5 in 1883, edition 6 in 1885, edition 7 in 1887, edition 8 in 1888. He also issued in 1887 "An Analytical Key to West Coast Botany containing descriptions of Sixteen Hundred Flowering Plants growing west of the Sierra Nevada and Cascade crests, from San Diego to Puget Sound." There was a re-issue of this in 1888, followed in 1898 by "West Coast Botany, an Analytical Key to the Flora of the Pacific Coast in which are described Eighteen Hundred species of

Flowering Plants from San Diego to Puget Sound" (pp. 221). All of these editions are in my botanical library. He also issued in 1897 a small book entitled "Exercises in Botany for the Pacific States" (pp. 120).

One of Rattan's interests was associated with the California Floral Society. As a result of this interest he contributed a Botanical History of the Eschscholtzia to Emory E. Smith's book, The Golden Poppy (pp. 9-12,—1902). I have no records of other writings except a paper in the Botanical Gazette (vol. 11, p. 338,—1886), in which he describes as new two species of California plants, Campanula exigua from Mt. Diablo, and Gilia ambigua from Oak Hill, four miles south of San Jose, both of which we now know to be rarities and easily overlooked.

Rattan collected chiefly near his places of residence, except that in his vacations he developed a great interest in the region of the North Coast Ranges which he explored for many years. There are no definite and clear records of his expeditions into this region in successive years. He traveled with a light buggy and single horse, or in the rougher mountains with pack animals. It was largely a virgin region to the foot of any botanist and the fruits of his collecting were notable. His first expedition was made in 1878. A lumber steamer took him to Crescent City where he bought a pack horse and set out into the mountains, following the trails, never the roads. On one occasion, in June, 1884, starting from the upper Sacramento Valley he entered the Coast Range foothills by way of Stony Creek and thence made his way across the mountains westerly to the ocean. On this expedition he collected Euphorbia Rattani Watson, Gilia Rattani Gray, Mimulus Rattani Gray and Phacelia Rattani Gray, and re-gathered such rarities as Schizonotus purpurascens Gray (Solanoa purpurascens Greene). He was on the Klamath and Trinity Rivers and Humboldt ridges in 1878 and 1879 at which time he collected Collinsia linearis, Collinsia Rattani and Pentstemon Rattani, all published as new by Asa Gray. The flora of the river basins of Humboldt County engaged his attention in 1882 and 1883, and in previous and later years of which I have no satisfactory records, he was steadily exploring various parts of the North Coast Ranges.

The biological spirit was well developed in Volney Rattan, his acute preceptions leading him to an abiding interest in the life history of the native seed plants. Amongst his interesting field studies may be mentioned the peculiar germination of Echinocystis which Charles Darwin acknowledged and illustrated in his "Power of Movement in Plants" (Appleton ed., 1881, p. 82).

Berkeley, Jan. 10, 1920.